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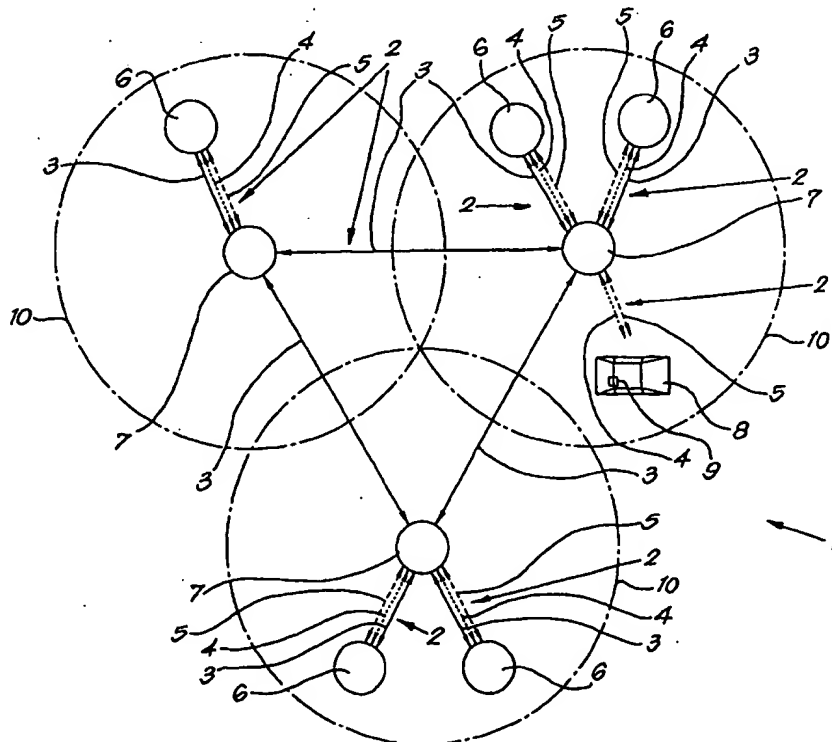
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(54) Title: METHOD AND DEVICE FOR ESTABLISHING COMMUNICATION LINKS WITH VEHICLES

## (57) Abstract

Method for establishing communication links with vehicles, in particular road vehicles, characterised in that the communication links are established over a network (2) which has different communication channels (3-4-5) of various sorts; in that use is made of various application centres (6) for providing data and/or services; and in that use is made of at least one central communication centre (7) which is incorporated in said network (2), whereby the link between the application centres (6) and the vehicles (8) is established via one or several of such central communication centres (7), whereby such a central communication centre (7), such central communication centres (7) respectively, automatically decide via which communication channel (3-4-5) every communication concerned between an application centre (6) and a vehicle (8), in particular a module (9) provided in said vehicle (8), will be established.



Method and device for establishing communication links with vehicles.

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The present invention concerns a method and a device for establishing communication links with vehicles, in particular road vehicles.

10 The invention aims a method and a device which make it possible to offer a transparent and secure communication with vehicles which are equipped with a telematics platform.

15 To this end, the invention concerns a method for establishing communication links with vehicles, in particular road vehicles, characterised in that the communication links are established over a network which has different communication channels of various sorts; in  
20 that use is made of various application centres for providing data and/or services; and in that use is made of at least one central communication centre which is incorporated in said network, whereby the link between the application centres and the vehicles is established via one  
25 or several of such central communication centres, whereby such a central communication centre, such central communication centres respectively, automatically decide via which communication channel every communication concerned between an application centre and a vehicle, in  
30 particular a module provided in said vehicle, or in other words a 'telematics platform', will be established.

This method enables application centres, by which are meant centres offering services and information in an electronic  
35 manner, to provide an unlimited number of services to a

vehicle in a smooth manner. The above-mentioned services can be of different nature, whereby every application centre is specialised in its own services. They may for example be application centres supplying navigational data so as to enable the driver of a vehicle to follow a desired route, application centres dealing with emergency calls, application centres following up fleet data (for example of a fleet of lorries), application centres providing traffic information, etc.

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As the central communication centres establish the contact between several application centres on the one hand and the vehicles making use of the system concerned on the other hand, a large number of links can be established in a secure and rational manner, whereby the central communication centres are responsible for the communication. Thanks to the split responsibility for the data and the communication of the application centres and every communication centre concerned, the investments in hardware and communication are lowered, so that the cost of every single application is lowered. The service providers, in other words the above-mentioned application centres, can concentrate on the development of the services offered, whereas the central communication centres take care of the compatibility, security and privacy of the communication.

It is clear that, thanks to the centralisation of the management of the communications as such, the connections can be offered at an optimal cost price.

Preferably, the communication channels to be used are selected on the basis of communication protocols, in particular communication protocols between an application centre and a module in a vehicle.

Different possibilities can be used for the communication channels, whereby the selection is made as a function of the communication protocol. Preferably, a selection will  
5 be made between two or several of the following types of communication channels: communication via a cable network, wireless long-distance communication, in particular via a paging network, wireless short-distance communication by means of short-wave signals, communication via a cellular  
10 network and communication via satellite.

The communication protocols may contain different criteria, such as for example establishing priorities, whereby the central communication centres make a selection between the  
15 communication channels, and also regulate the communication transmission as a function of said priorities. These protocols also make sure that the switching between the communication channels is done in an appropriate manner, that messages are confirmed, etc.

20 Preferably, every application centre will communicate directly and exclusively with one central communication centre. Possible communications via other communication centres always go via the first-mentioned communication  
25 centre.

When use is made of several central communication centres, the links between the central communication centres and the vehicles are preferably established via the central  
30 communication centre which is active in the region where the vehicle is situated. This offers the advantage that the direct connections with the vehicle are always local, as a result of which such connections can never put a heavy load on the network as a whole.

In case use is made of several central communication centres, every vehicle preferably gets assigned its own central communication centre, whereby basic data regarding the vehicle are stored in this central communication centre. In this manner, a vehicle always has a 'home' communication centre in which the above-mentioned basic data are stored, where this basic information can be retrieved if necessary by means of what is called 'roaming'.

When dealing with the communications, it is possible to apply different security levels according to the invention for sending the communication messages, depending on the necessity thereof. To this end, the messages are encrypted in the central communication centres, depending on the specific security level. The identity of every sender of a message is preferably authenticated by means of digital signatures and certificates, possibly with the use of an identification card for every driver of a vehicle.

The secret keys and the databases which are required to this end are preferably managed by the central communication centres. In this manner, the reliability of the exchanged data can be guaranteed.

According to the invention, the central communication centres can provide for different functionalities, a number of major possibilities of which are enumerated hereafter:

- scanning of the application centres, whereby the central communication centre validates the application centres, among others in view of the control of their credibility and solvency;
- registration of users and storage of this registration, so that it is possible to check as of the central

communication centres for what user is established a communication;

- creation of user files, in which the users' behaviour is preferably stored, so that it is possible to offer statistical information to the data suppliers or to other parties;
- service management, in particular the automatic supply of different data, such as the transmission of information in the required language version. In this way, the users can be informed about a new or updated version and they can receive commercial messages;
- providing specific information data oneself, if so desired with the possibility of downloading to a module in a vehicle and updating of the information;
- co-ordination of the system software of the modules in the vehicles. A module will preferably carry out a self-test at set times, the results of which are sent to the central communication centre, so that it can act in accordance with the received information;
- registration of the communications and the data of these communications. Registered data are for example all messages to and from a module which are taken note of, the used communication channel, the priority, the security level of the communication, the operator costs and special facilities which have been used by a module when a communication is established;
- support of the application centres for the registration of data regarding invoicing of the costs of the established communication links.

The characteristic whereby a selection is made between different communication channels, is preferably applied at least for the links between every vehicle and a central communication centre. It is not excluded however, to also

make a selection for communication links between the application centres and the central communication centres or between the central communication centres among themselves.

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The invention also concerns a device, in particular a communication system, for establishing communication links with vehicles, preferably according to the above-described method, characterised in that it consists of the  
10 combination of a network which has different types of communication channels; different application centres for providing data and/or services; at least one central communication centre which is incorporated in said network which is equipped with means which decide via which  
15 communication channel every communication concerned between an application centre and a vehicle, in particular a module provided in this vehicle, will be established.

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The device preferably has different central communication centres which can communicate among themselves, and every application centre is directly connected with only one central communication centre.

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The central communication centres can hereby communicate among themselves. As for the direct communications with the vehicles, every communication centre preferably only covers its own region.

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In order to better explain the characteristics of the invention, the following preferred embodiment is described as an example only without being limitative in any way, with reference to the sole accompanying drawing, in which a device according to the invention is schematically represented.

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As is represented in the accompanying figure, the device 1 according to the invention mainly consists of a network 2 having different types of communication channels 3-4-5; different application centres 6 for providing data and/or services; at least one, and in the given example three central communication centres 7 incorporated in the above-mentioned network 2 which are equipped with means which decide via which communication channel 3, 4 or 5 every communication concerned between an application centre 6 and a vehicle 8, in particular a module 9 provided in this vehicle 8, also called telematics platform, is established.

The application centres 6 are service-providing centres which make their information available in an electronic manner. Every application centre 6 is preferably exclusively connected with a single central communication centre 7, i.e. connected directly with only one of them.

The central communication centres 7 are mutually connected, which is possible in an arbitrary manner. What is important is that every communication centre 7 can communicate with any other communication centre 7 of the same network 2.

The central communication centres 7 each cover a restricted region 10, such that a module 9 of a vehicle 8 will always communicate with the central communication centre 7 of the region 10 in which it is situated. Insofar as these regions 10 overlap, certain criteria can be provided which determine with what central communication centre 7 will be established a connection.

The communication channels 3, 4 and 5 in this case consist for example of a cable network, such as a conventional telephone network, what is called a 'paging' network and a



connection via a cellular telephone network. It is clear, however, that other forms of communication channels are possible, such as for example satellite links or other links.

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In the given example, there are different communication channels between the application centres 6 and the central communication centre 7 with which they are directly linked on the one hand, and the central communication centres 7 and the vehicles 8 on the other hand. It is clear, however, that according to a variant, the possibility to choose between different communication channels can also be provided between the central communication centres 7 among themselves. Nor is it excluded to provide only one communication channel between the vehicles 8 and the central communication centres 7, whereby it is then possible to select another link.

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The working of the device 1 and the method applied therewith are described in the introduction. It mainly consists in that the application centres 6 provide information or can be called in order to transmit information. All exchange of information takes place via the central communication centres 7, which allows for a complete optimisation of the communications, as already explained in the introduction. This is where also the management and control take place.

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The invention is by no means limited to the above-described embodiment represented in the accompanying drawing; on the contrary, such a method and device can be made in all sorts of variants while still remaining within the scope of the invention.

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Claims.

5 1. Method for establishing communication links with vehicles, in particular road vehicles, characterised in that the communication links are established over a network (2) which has different communication channels (3-4-5) of various sorts; in that use is made of various application  
10 centres (6) for providing data and/or services; and in that use is made of at least one central communication centre (7) which is incorporated in said network (2), whereby the link between the application centres (6) and the vehicles (8) is established via one or several of such central  
15 communication centres (7), whereby such a central communication centre (7), such central communication centres (7) respectively, automatically decide via which communication channel (3-4-5) every communication concerned between an application centre (6) and a vehicle (8), in  
20 particular a module (9) provided in said vehicle (8), will be established.

2. Method according to claim 1, characterised in that the selection of the communication channels (3-4-5) to be used  
25 is made on the basis of communication protocols.

3. Method according to claim 1 or 2, characterised in that, for the communication channels (3-4-5), use is made of two or several of the following types of communication channels  
30 (3-4-5): communication via a cable network, wireless long-distance communication, in particular via a paging network, wireless short-distance communication by means of short-wave signals, communication via a cellular network, communication via satellite.

4. Method according to any of the preceding claims, characterised in that the communication takes place with priorities, whereby the central communication centres (7) choose between the communication channels (3-4-5) and also  
5 regulate the transmission of the communications as a function of these priorities.

5. Method according to any of the preceding claims, characterised in that every application centre (6)  
10 communicates exclusively and directly with a single central communication centre (7), whereby possible communications via other communication centres (7) always go through the first-mentioned communication centre (7).

15 6. Method according to any of the preceding claims, characterised in that use is made of several central communication centres (7) and in that the links between the central communication centres (7) and the vehicles (8) are always established via the central communication centre (7)  
20 which is active in the region (10) in which the vehicle (8) is situated.

7. Method according to any of the preceding claims, characterised in that use is made of several central  
25 communication centres (7) and in that every vehicle (8) gets assigned its own central communication centre (7), whereby basic data regarding the vehicle (8) are stored in this central communication centre (7).

30 8. Method according to any of the preceding claims, characterised in that different security levels are maintained for sending the communication messages, depending on the necessity thereof.

9. Method according to any of the preceding claims, characterised in that the central communication centres (7) provide for one or several of the following functionalities:

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- scanning of the application centres;
- registration of users and storage of this registration;
- creation of user files;
- service management, in particular the automatic supply
- 10 of different data, such as the transmission of information in the required language version;
- providing specific information data oneself, if so desired with the possibility of downloading to a module in a vehicle and updating of the information;
- 15 - co-ordination of the system software of the modules in the vehicles;
- registration of the communications and the data regarding these communications;
- support of the application centres for the registration
- 20 of data regarding invoicing of the costs of the established communication links.

10. Method according to any of the preceding claims, characterised in that the different communication channels

25 (3-4-5) are at least applied for the links between every vehicle (8) and a central communication centre (7).

11. Device, in particular a communication system, for establishing communication links with vehicles,

30 characterised in that it consists of the combination of a network (2) which has different types of communication channels (3-4-5); different application centres (6) for providing data and/or services; at least one central communication centre (7) which is incorporated in said

network (2) which is equipped with means which decide via which communication channel (3-4-5) every communication concerned between an application centre (6) and a vehicle (8), in particular a module (9) provided in this vehicle (8), will be established.

12. Device according to claim 11, characterised in that it has different central communication centres (7) which can communicate among themselves, and in that every application centre (6) is directly connected with only one central communication centre (7).

13. Device according to claim 11 or 12, characterised in that use is made of several central communication centres (7); in that these central communication centres (7) can communicate among themselves; and in that these communication centres (7), as for the direct communications with the vehicles (8), each cover an own region (10).